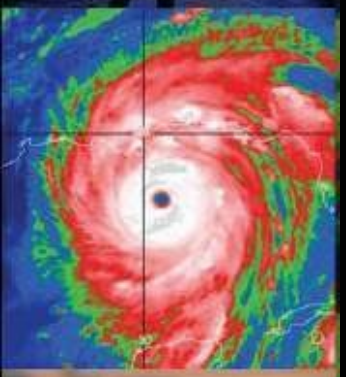


Systems Based Approaches to Hurricane Storm Surge Modeling

Virginia Brisley

21 May 2008

Coastal Storm Surge Modeling: Overview

- Joint Coastal Surge Analysis
  - Resources
  - Methodology
  - Output
- Systems Based Approach
  - Planning and scheduling
  - Interagency collaboration
  - Consistent methodology
  - Cumulative impact assessment
- Lessons Learned and Key Points

Resources:
Collaborating Organizations

- USACE-MVN
- USACE-SWG
- ERDC
- FEMA Region 6
- NOAA
- U of Notre Dame
- U of Oklahoma
- U of Texas

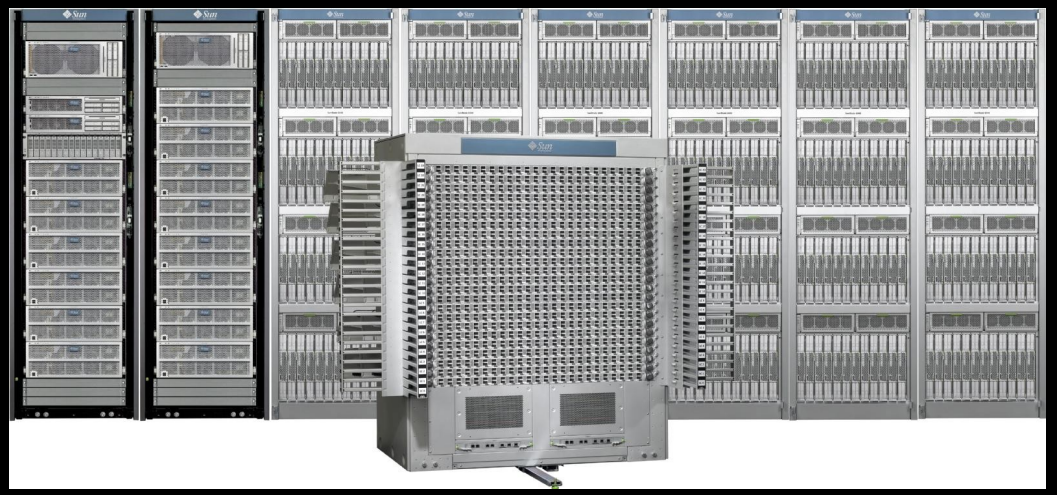
- ARCADIS
- Taylor Engineering
- Ayres Associates
- OceanWeather
- Applied Risk Associates
- Royal Haskoning

>65 personnel active on project.
>100 total involved.

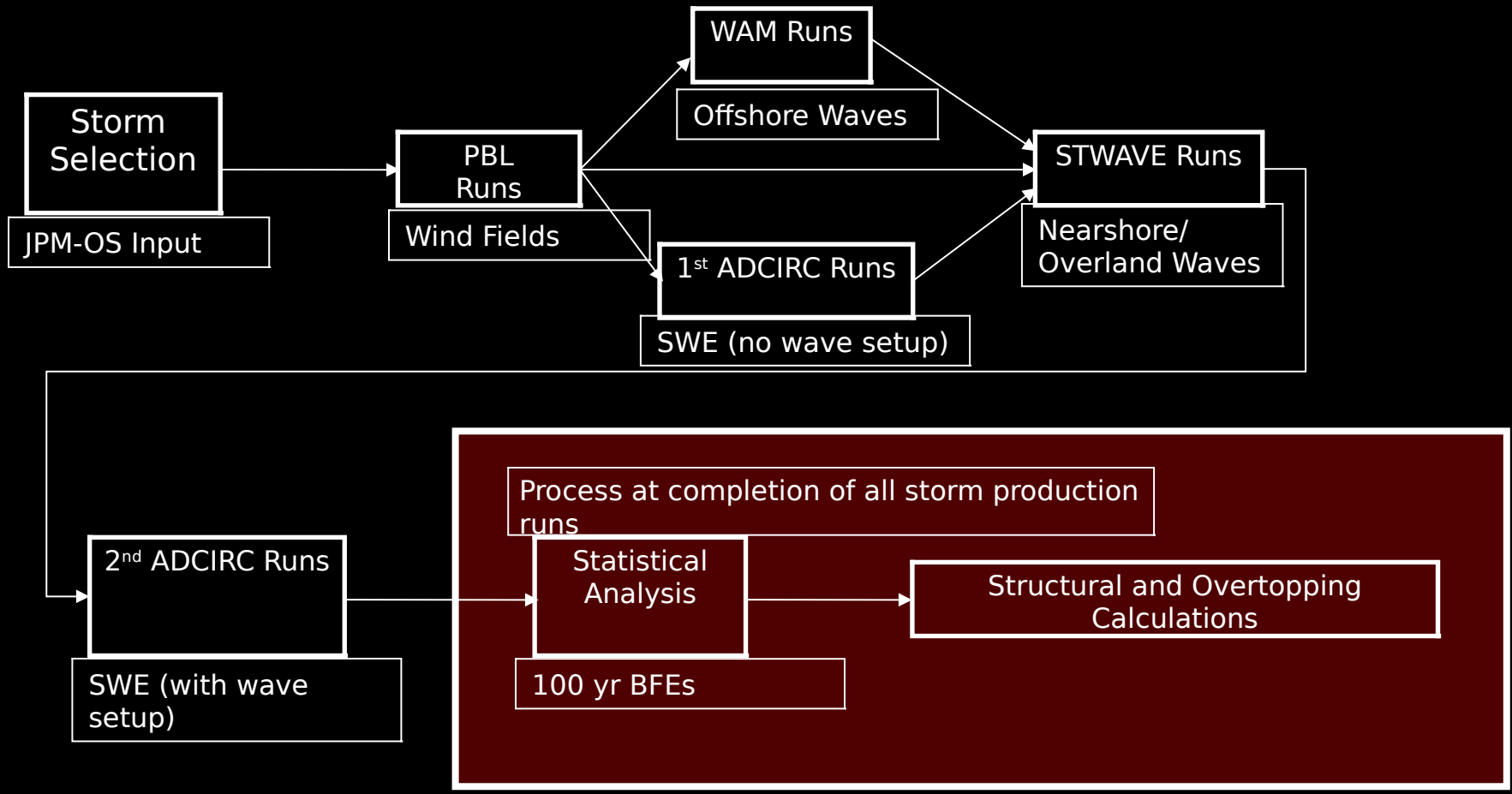
Resources:
High Performance Computing

Clock hours per storm:

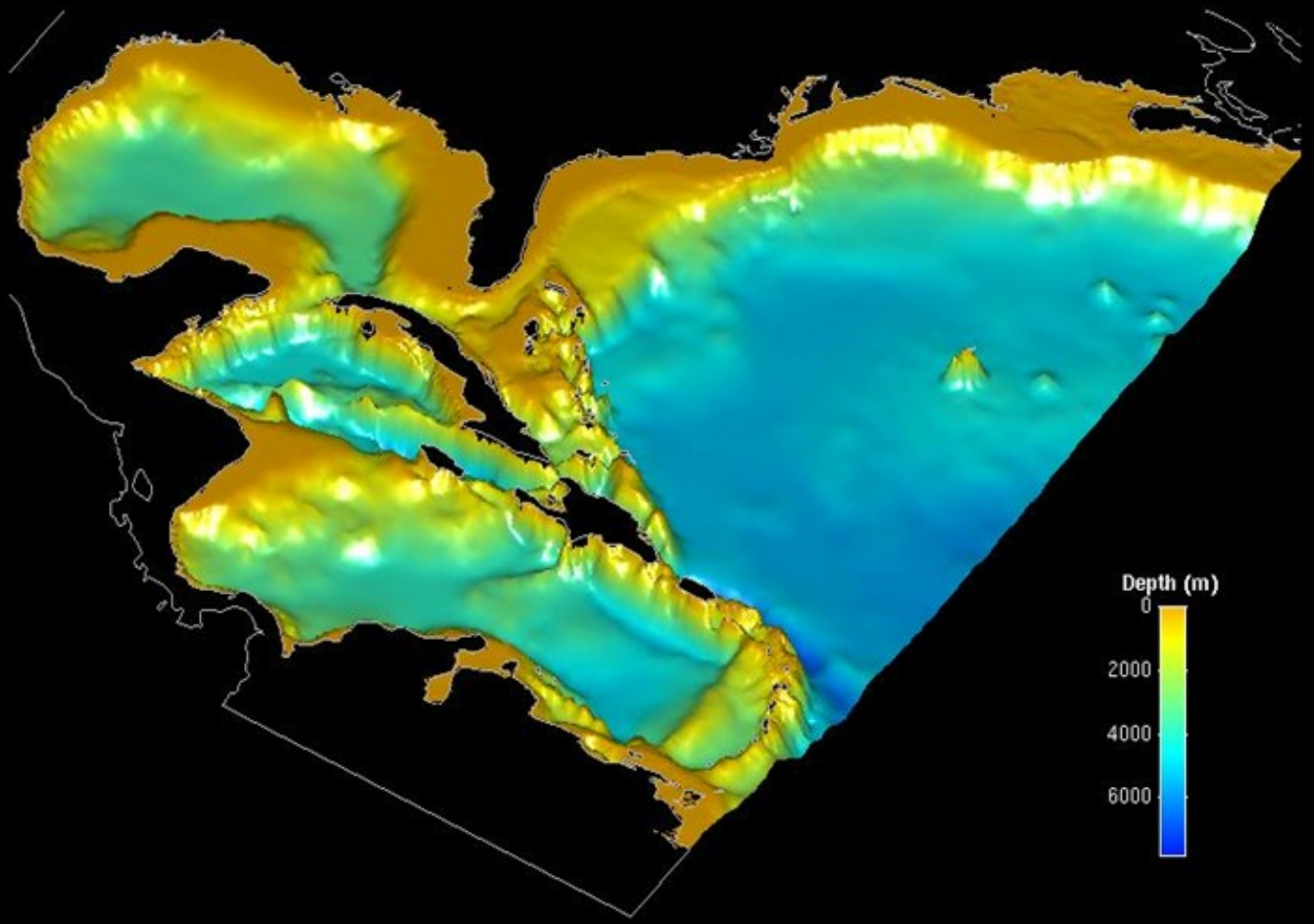
Cray XT3	*ERDC Sapphire*	*7.8 hours*
Sun Constellation	*UT Ranger*	*40 minutes*
Dell Linux Cluster	*UT Lonestar*	*8 hours*



Methodology: Work Flow

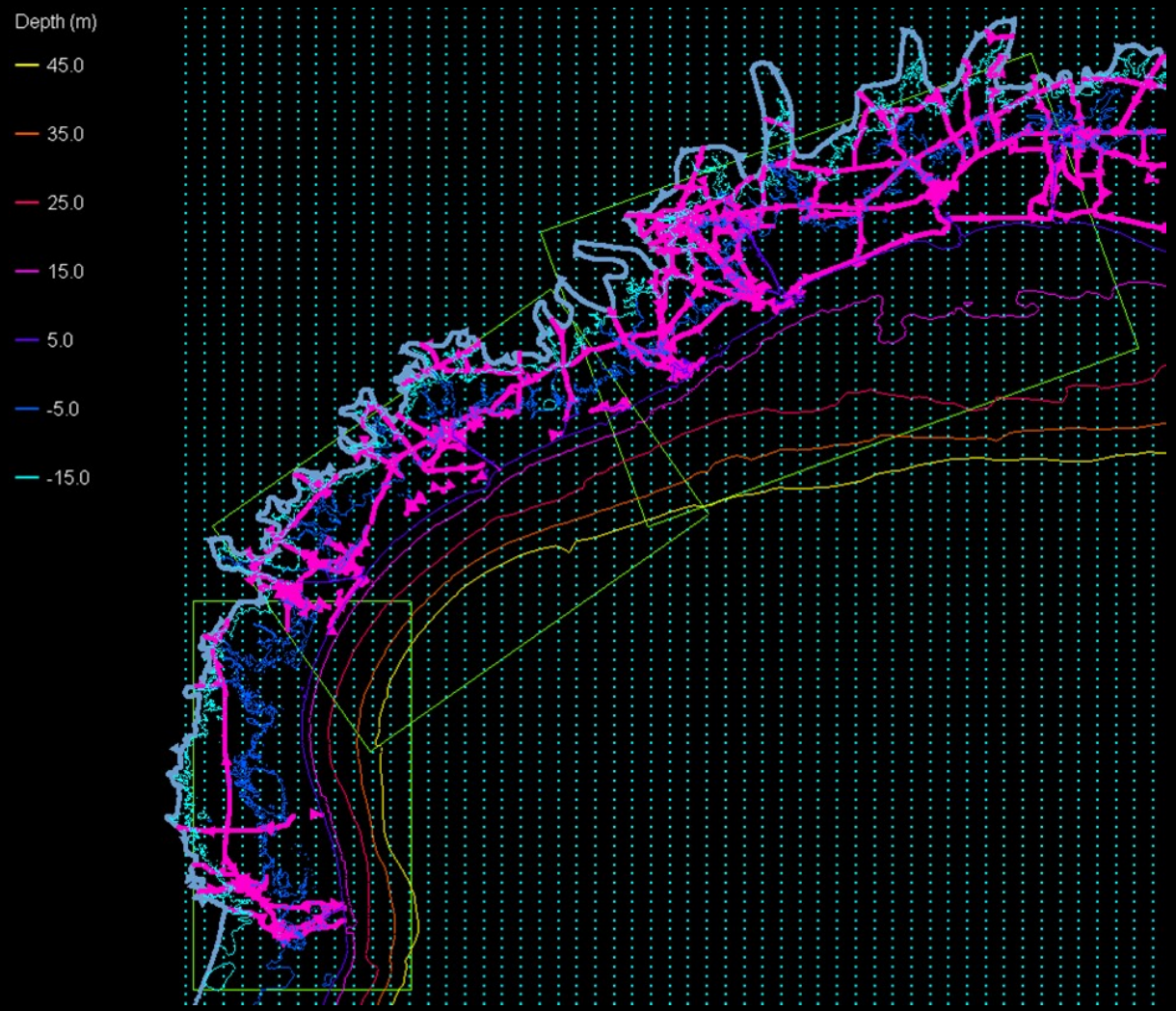


Methodology:
ADCIRC Grid

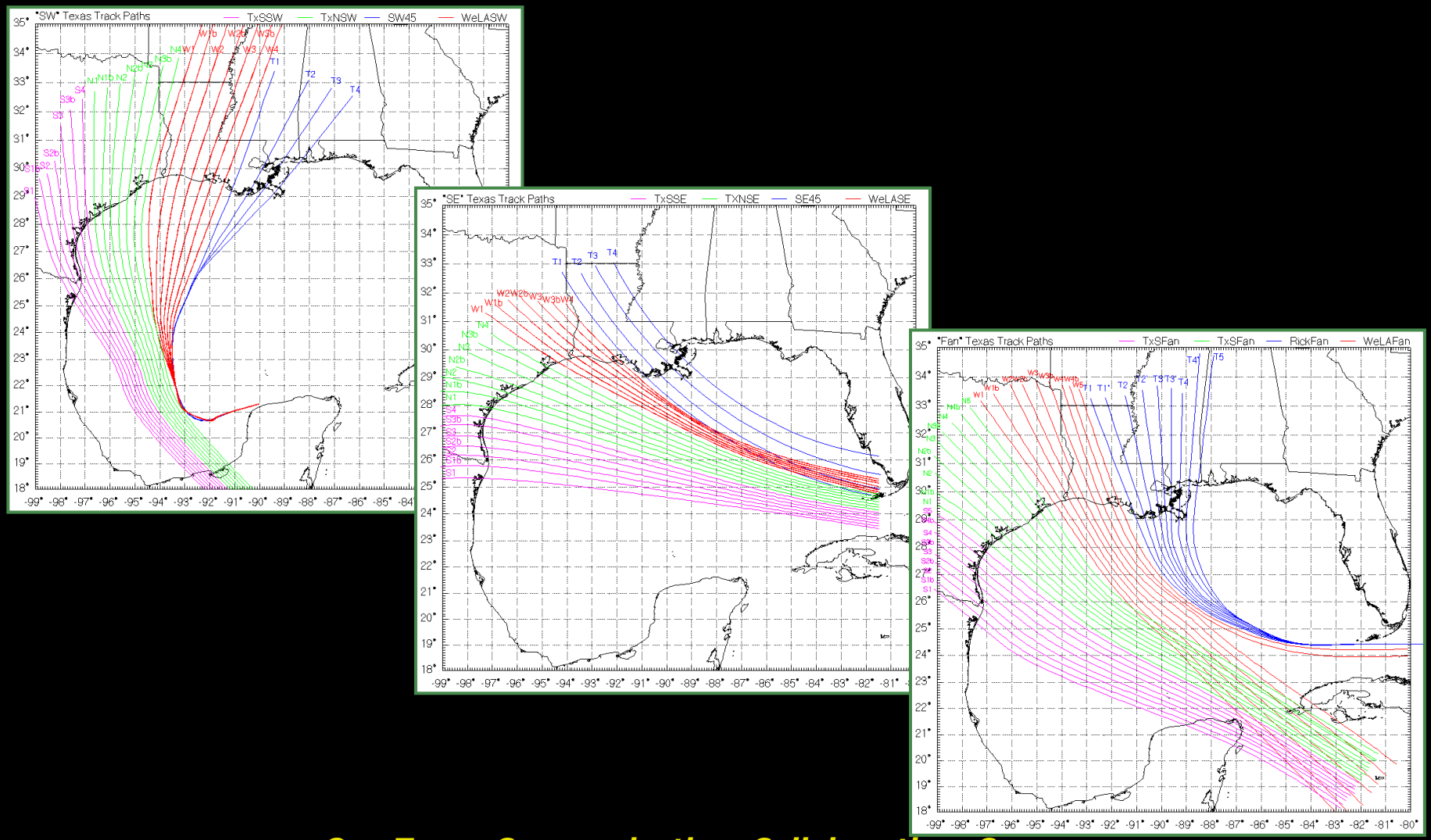


- Finite Element
- 2 million nodes
- >90% in LA/TX coastal areas

Methodology:
WAM & STWAVE Grids



Methodology:
JPM-OS Storm Tracks



Output:
Surge Data

The following projects utilize the data generated by the Surge Modeling Team:

- Interagency Performance Evaluation Taskforce (IPET)
- Louisiana Coastal Protection and Restoration (LACPR)
- Greater New Orleans Hurricane and Storm Damage Risk Reduction System (GNOHSDRRS)
- Inner Harbor Navigation Canal (IHNC)
- Federal Emergency Management Agency (FEMA) – Map Modernization Program (LA & TX)
- Morganza to the Gulf
- ** All future feasibility studies involving hurricane risk reduction conducted by MVN **

Storm Surge Analysis:
A Systematic Tool

Systems Based Approach to evaluating storm surge across the Gulf Coast:

- Consistent with Corps' *12 Actions for Change*, specifically "Plan…projects as parts of larger, integrated systems…and [evaluate] the local and regional implications of alternative concepts for achieving project goals. "
- Determining project specific effects of structural hurricane protection measures upon the immediate area under investigation
- Assessing cumulative impacts of hurricane protection systems across the southern coast of the United States

Storm Surge Analysis:
A Systematic Tool

Systems Based Approach to evaluating storm surge across the Gulf Coast (cont'd):

- Employing consistent methodology in analyzing storm surge across the coast
- Planning and sequencing storm surge analysis work to avoid competing resources
  - Manpower
  - Computer
- Extensive Independent Technical Review (ITR) phased throughout process of analysis
- Interagency collaboration to determine coastal storm surge values

Key Takeaway Points

- Integrating multiple state of the art software packages ensures precision in developing a system model
- Analyzing single projects as part of a whole system is the basis for a holistic evaluation of cumulative impacts on the Gulf Coast
- Utilizing one methodology for conducting storm surge analysis for the Gulf Coast ensures consistency across the various hurricane protection projects
- Interagency collaboration led to consensus in storm surge values
- Sequencing, coordinating and scheduling multiple modeling efforts requires teamwork, communication and eliminates duplication of efforts

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